



CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

NEWS RELEASE

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

FOR IMMEDIATE RELEASE:

**Release No. 05- 05
September 23, 2005**

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New OEHHA Study Finds Links Between Fine Airborne Particles and Deaths in California

In one of the first studies of its kind, scientists at Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) and the University of California (UC) have found that fine particles emitted by motor vehicles and other sources may increase deaths from heart and lung ailments in California.

The study, published in the scientific journal *Environmental Health Perspectives*, found associations between levels of fine particles in nine California counties and deaths from heart and lung ailments in the general population of those counties, particularly among diabetics, people with respiratory and cardiovascular diseases, the elderly, and women.

While many studies have documented that airborne particulate matter in general (defined as particles less than 10 microns in diameter) can increase death rates, the OEHHA study was one of the first to examine such associations involving fine particles (defined as particles less than 2.5 microns in diameter).

"This study provides support for initiatives by both the state and federal governments in recent years to specifically regulate fine particles," OEHHA Director Dr. Joan Denton said. "In our efforts to reduce the levels of particles in the air we breathe, we should not overlook the potential health impacts of the smallest of these particles."

The study was also important because it looked at links between fine particles and mortality rates in California, said OEHHA epidemiologist Dr. Bart Ostro, who headed the study. Most other studies to date of fine particles have been conducted in the eastern U.S., Canada and Europe, where the sources and chemical composition of the particles are different than in California. Motor vehicles are the predominant source of fine particles in California, while fine particles in those other regions come from a mix of motor vehicles, power plants and other industrial sources.

In conducting the study, scientists from OEHHA, UC San Francisco and UC Davis analyzed daily air monitoring and mortality data from 1999 through 2002 from Contra Costa, Fresno, Kern, Los Angeles, Orange, Riverside, Sacramento, San Diego and Santa Clara counties. The nine counties account

for about 65 percent of California's population. Air sampling data on fine particles was obtained from the Air Resources Board and the U.S. Environmental Protection Agency, while mortality data was obtained from the Department of Health Services.

The researchers found that overall death rates in those counties were higher during periods when fine particle levels were elevated, even after controlling for other potential causes of death. Associations between fine-particle levels and death rates were particularly strong for diabetics, the elderly, people with respiratory and cardiovascular diseases, and women. Deaths occurring outside of hospitals were also associated with fine particle levels, as was mortality among people with less than a high school education (which is probably a reflection of nutritional status, access to health care, occupation, stress and residential proximity to heavy traffic).

Fine particles are about 1/25th of the width of a human hair, and can be inhaled deep into the lung. Deaths linked to fine particles would be expected to be limited primarily to those who have pre-existing disease. However, the OEHHA study adds to a growing body of evidence that links exposure to fine particles to hospital admissions, emergency room visits, asthma attacks, respiratory symptoms and diminished lung function, Ostro said.

In 2002, ARB established the state's first ambient air-quality standards for fine particles that were based in part on evaluations performed by OEHHA. Later this year, U.S. EPA is expected to propose updated national ambient air-quality standards for fine particles that would replace existing standards adopted in 1997.

Until the last decade, regulators made little distinction between "coarse" particles up to 10 microns in size, and "fine" particles no larger than 2.5 microns. However, the two kinds of particles have different sources. Coarse particles are often dust originating from unpaved roads, construction activities and agricultural plowing, while fine particles typically are produced from the combustion of fuels.

The OEHHA study is available on-line at <http://ehp.niehs.nih.gov/members/2005/8335/8335.pdf>.

The Office of Environmental Health Hazard Assessment is one of six entities within the California Environmental Protection Agency. OEHHA's mission is to protect and enhance public health and the environment by objective scientific evaluation of risks posed by hazardous substances.

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